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A DOZEN PARADOXES OF SPECIAL RELATIVITY

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Abstract

In more than a dozen examples, the coordinate transformation known as the Special Relativity Theory is applied. The exact application of this transformation results in disagreement with generally known natural phenomena and with 5 experimentally verified laws of physics. At the same time, there is a disagreement with the first principle of Special Relativity Theory.

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1 Introduction

In 1905, Albert Einstein published a paper "On the Electrodynamics of Moving Bodies" ("Zur Elektrodynamik bewegter Körper") [1], which is now known as the Special Relativity Theory (SRT). Today, this theory is accepted by the mainstream of physicists. Challenging this theory threatens the professional careers of physicists.

The mainstream physicists believe that there is ample experimental evidence for the validity of SRT. Nevertheless they continue to invest huge amounts of time and effort to validate relativity (special and general), e.g. LIGO [2].

The "twin paradox" is well known [3] and less well known is the "Bell spaceship paradox" [4].

Special isorelativity (SIR) - [5] which has been developed for the dynamics of extended particles contains paradoxes as well (see in particular Sect. 8 on).

2 SRT

First, let's quote the necessary parts of the text from the translated original SRT [6].

p. 41: **§2. On the Relativity of Lengths and Times**

"The following reflexions are based on the principle of relativity and on the principle of the constancy of velocity of light. These two principles we define as follows:

1. The laws by which the states of physical systems undergo change are not affected, whether these changes of state be referred to one or the other of two systems of co-ordinates in uniform translatory motion.

2. Any ray of light moves in the "stationary" system of co-ordinates with the determined velocity c, whether the ray is emitted by stationary or by a moving body."

p. 48: "so that the transformation equations which have been found become

$$\tau = \beta(t - vx/c^2)$$

$$\xi = \beta(x - vt)$$

$$\eta = y$$

$$\zeta = z$$

where

$$\beta = 1/\sqrt{1 - v^2/c^2}."$$

p. 48: **§4. Physical Meaning of the Equations Obtained in Respect to Moving Rigid Bodies and Moving Clocks**

"We envisage a rigid sphere of radius R, at rest relatively to the moving system k, and with its centre at the origin of co-ordinates of k. The equation of the surface of this sphere moving relatively to system K with velocity v is

$$\xi^2 + \eta^2 + \zeta^2 = R^2$$

The equation of this surface expresed in x,y,z at time $t=0$ is

$$\frac{x^2}{(\sqrt{(1 - v^2/c^2)})^2} + y^2 + z^2 = R^2$$

A rigid body which, measured in the state of rest, has the form of sphere, therefore has in a state of motion - viewed from stationary system - the form of an ellipsoid of revolution with axes

$$R\sqrt{(1 - v^2/c^2)}, R, R.$$

Thus, wheras the Y and Z dimensions of the sphere (and therefore of every rigid body of no matter what form) do not appear modified by the motion, the X dimension appears shortened in the ratio $1 : \sqrt{1 - v^2/c^2}$, i.e. the greater the value v, the greater the shortening."

p.49: "It is clear that the same results hold good of bodies at rest in the "stationary" system, viewed from a system in uniform motion."

From the described transformations of the coordinate system, we prepare relations for the transformation of the distance l between two points and time interval τ:

$l_\xi = \beta l_x$; $l_\eta = l_y$; $l_\zeta = l_z$; $\tau = \beta t$ where $\beta = 1/\sqrt{1 - v^2/c^2}$ - **(1)**

3 Alien Bob

To describe the implications of using SRT transformations, we use the example of a second coordinate system moving at *v=0.87c* in the ecliptic plane of the Earth. Thus β (or γ) = 0.5.

To illustrate, let us use the idea of an alien Bob moving towards (or away from) Earth at velocity v. It is irrelevant whether Bob has technology unknown to us or whether we use the idea of an alien Bob moving away from Earth at velocity v due to the expansion of the Universe.

3.1 Earth rotation effect

According to SRT, Bob sees, in accordance with [6] i.e. **(1)**, a rotational ellipsoid with an axis ratio of 1:2. The orientation of the flattening of the ellipsoid depends on the direction in which Bob is moving.

We know that the Earth rotates once every 24 hours, but the ellipsoid does not rotate, it is fixed in the direction of Bob's movement.

3.2 Elevator on the equator

In areas on the equator, e.g. in Ecuador, everything moves up and down during the day. Like being in a huge elevator. It moves away from the center of the Earth and moves closer again. This is repeated twice a day.

The size of the movement is remarkable. The height difference (the difference in the distance between the surface of the Earth and the center of the Earth) is more than 3,000km.

The maximum speed of upward movement is 825km/h, i.e. the height of 93 Mount Everests per hour, that means the rise to the height of Mount Everest measured from sea level to the top in less than 39 seconds.

And then fall back down at the same speed. And this is repeated every 12 hours. It is noteworthy that the time when the ascent and descent occur does not depend on anything on Earth, but depends on the direction of movement of the coordinate system, that is, the direction of movement of the alien Bob.

It is also remarkable that the air pressure does not change during such movement, so there is no risk of mountain sickness like on Mount Everest. At the same time, the height difference is 360 times greater than the height of Mount Everest.

It is remarkable that all rocks shrink and expand again even at great depths without mechanical damage. Reducing the height of a granite or limestone massif by half and then increasing it to its original height without cracking the granite or limestone is incredible.

3.3 The orbit of the Earth around the Sun

Alien Bob also tracks the Earth's orbit around the Sun. It is not almost circular in his coordinate system as we know it, but elliptical. At first glance, this is nothing extraordinary, the planets move in elliptical orbits.

It is noteworthy that the orientation of the ellipse, i.e. the direction of their axes, is not related to the movement of the Earth or something from the Solar System, but depends on the direction of movement of the coordinate system, i.e. the direction of movement of the alien Bob.

Another oddity is the fact that the Sun is not in one of the foci of the ellipse, as it should be according to Kepler's 1st law, but is in the center of the ellipse.

The eccentricity of the ellipse $e = \sqrt{a^2 - b^2}$ where a=*1au*, b=*0.5au* is e=*0.87au*. This is the distance of the focus of the ellipse from the center of the ellipse. Because $1au \approx 150\, mil.\, km$. So the Sun is about 130 million km away from where it should be according to Kepler's 1st law.

Also, the area described by the Earth's line segment is not constant. It differs by more than 20% 4 times a year, so the movement of the Earth does not coincide with Kepler's 2nd law.

Analysis of the measured speed and acceleration of the Earth's elliptical orbit brings another surprise.

The speed of the Earth's movement changes in a ratio of 1:2 2 times per year, i.e. 2x per one revolution of the Earth around the Sun. This is 2 times more often than is measured for bodies observed from Earth moving in elliptical orbits.

Also noteworthy is the centripetal acceleration calculated from the curvature of the Earth's trajectory. The acceleration drops to $\frac{1}{2}$of the maximum value twice a year, precisely at the point when the Earth is closest to the Sun. The maximum curvature of the Earth's trajectory is when the Earth is farthest from the Sun. This contradicts at least Newton's law of gravity.

According to the law of gravity, the gravitational force should be 4 times greater when the Earth is closest to the Sun than when it is farthest from the Sun. The curvature of the trajectory should be proportional to the gravitational force. Thus, according to Newton's laws, the curvature of the Earth's trajectory should be greatest at the time when the Earth is closest to the Sun.

3.4 The train effect

For trains traveling on the east-west track in the equatorial region, two effects occur (2 times a day).The wagons and the people in the wagons are reduced to half their height. Twice a day, the distances between stations are halved and at the same time the tracks are shortened (including the shortening of the distances between track connectors and between sleepers).

For trains traveling on the north-south line, the effect of changing the track gauge occurs twice a day. So the tracks will approach each other at half the distance. At the same time, the length of the sleepers and the length of the axles of the wagons and locomotives also change. So a normal train becomes a narrow-gauge train twice a day.

3.5 Subway effect

In the case of the subway (metro) line in the east-west direction, the height of the tunnel is reduced twice a day. At the same time, the height of the subway train, the height of the people in the subway, and the height of the seats in the carriages are also reduced. At the equator it is halved, at higher

latitudes less. In London or Paris it is only about a third.

In the case of the metro line in the north-south direction, the gauge of the tracks changes twice a day, the width of the tunnel and also the width of the metro carriages also change at the same time. In them, the width of the seats located perpendicular to the direction of travel changes, and the width of the seats located along the walls of the wagons does not change.

Passenger dimensions also change. Either nose size or shoulder width.

3.6 Bridges effect

Bridges are lowered and raised again twice a day. The height of the bridges is changing, including the height of the support columns. These change the more the higher they are. Although the support columns of different heights change differently, the bridge remains straight.

If the bridge supports are made of concrete, they shorten and then lengthen without damaging the concrete.

In addition, the bridges in the east-west direction change their length twice a day. Unlike bridges in the north-south direction, which change their width. In all cases, this is without damage to the material of the bridges and without external forces.

E.g. Great concrete bridge in China [7], length 721m, length of the main field 445m, height above the valley 295m. Orientation east-west, position 25°N. Twice a day, the concrete arch of the bridge lowers by approx. 135m and then rises again, while the ends of the arch come closer by more than 220m. Although the bridge is made of concrete, it will not be damaged during such huge changes in dimensions. The deep valley over which the bridge leads does the same.

3.7 Buildings effect

Buildings also change their height twice a day, including lowering the ceilings and lowering the height of their residents.

At the same time, buildings change their width or length twice a day. Windows in the south or north facade change their width and height, unlike

windows in the east or west facade/wall, which change their height and glass thickness.

And that twice a day and without damaging the glass or frames. E.g. a window in a house in the equatorial area with dimensions of 2x2m in the south facade will decrease in height by 1m twice a day and narrow by 1m twice a day. And without damaging the glass or frames.

E.g. the tallest building in the world, Burj Khalifa, 828m high, lowers twice a day and rises again by more than 350m without any damage. The relatively smaller reduction is a result of the building's off-equatorial location.

3.8 Ship effect

Ships change draft (and height) twice a day, including large seagoing ships. The height of the locks and the depth of the canals (e.g. Panama, Suez) are changing. During handling in the port, the behavior of ships changes twice a day.

Twice a day, when the ship is turned by 90°, the ship shortens and widens or, on the contrary, lengthens and narrows. The draft does not change.

2 times a day it will decrease (including reducing the draft) and it will not change either length or width when rotated.

For example, the passenger ship Oasis of the Seas [8], which has a length of 360m, a width of 60m and a draft of 9m.

This ship will shorten by 180m or narrow by 30m at the equator depending on the turn of the ship. The draft changes twice a day by 4.5m.

3.9 Carousel effect

People sit on the carousel and it spins. Twice a day, the situation occurs that the skull of each person on the carousel is deformed at each revolution, so that during one revolution of the carousel, it narrows twice and widens twice, and also shortens twice and lengthens twice.

So, for example, on the carousel near the equator, during one rotation of the carousel, the skull, including the eyes, is halved twice, and the length of the skull, including the nose, is preserved. This alternates with a situation

where the width of the eyes and skull is normal, but the length of the skull is halved, the nose is halved, and the eye sockets are shallower and the eyeballs are flattened.

This is replaced in 6 hours by a situation where the width and length of the passengers' skull does not change when the carousel rotates, but is deformed from above, i.e. it is half the height of the forehead, half the height of the eyes, half the teeth.

3.10 The effect of high-voltage distribution systems

Let's observe the transmission routes of high-voltage power lines in the east-west direction.

Twice a day the columns will decrease and increase again. Twice a day the distance between the pillars is shortened and increased again.

When the columns get closer to each other, the wires will not sag more, but the opposite. The lowest point is higher than when the columns are further apart. The length and also the shape of the wires changes. When the columns are closest to each other, the cross-section of the conductors is circular, when they are farthest from each other, the conductors are flattened with an elliptical cross-section.

Let us recall that the resistance of a conductor is directly proportional to the length of the conductor and inversely proportional to the cross-section of the conductor, i.e. if the conductor is lengthened, its resistance will increase, if the cross-section is reduced, the resistance will also increase.

In the case of high-voltage lines near the equator, the situation is as follows. When the distance between the columns is halved, the length of each conductor is halved and thus the resistance drops by 50%.

In case of flattening of the conductor, i.e. in 6 hours after the shortening of the conductor, the cross-section will be reduced by half and thus the resistance will double.

This means that the resistance of the conductor changes twice a day in a ratio of 1:4.

The power loss in a conductor at constant current is directly proportional to the resistance of the conductor. So the power loss on the line conductors should change twice a day in a ratio of 1:4.

This ratio of resistances and therefore power loss depends on the speed of movement of the coordinate system, i.e. on the speed of movement of the alien Bob. The measuring instruments of the distribution network operator on Earth do not show this.

3.11 Glasses effect

Two people in the equatorial region have glasses, beautiful glasses with round frames. Bob observes what is happening with their glasses. One of them faces west and the other faces north.

For those who look to the west, the thickness of the glasses changes twice a day and thus the shape of the lens, which determines the optical parameters of the glasses (focal length / optical power - diopters). This alternates with a period when the shape of the frames, including the glass of the glasses, is deformed from circular to elliptical (recumbent ellipse). This is also reflected in the optical properties where the optical parameters of the glasses are different in different directions (cylindrical lens effects). Thus, the number of diopters of the glasses is reduced twice a day, and this alternates with the flattening of the frames and an increase in the optical power (increasing the number of diopters) depending on the direction (glasses with toric lenses compensating for astigmatism).

The glasses behave differently for those who look to the north. The shape of the frames changes from a lying ellipse to a standing ellipse. Four times a day, the frames of the glasses have a circular shape.

The thickness of the lens glass does not change. The optical properties of the glasses also change. The axis of the cylindrical component rotates by 90°(in steps four times a day). Cylindrical component in one direction increases, then decreases, axis changes, followed by growth and then decrease in the other axis and again direction change, increase and decrease...

Like the lens of glasses, the lens of the eye and the eye deform. When the optical power (number of diopters) of the glasses decreases, the optical power of the lens of the eye and the eye itself also decreases. Optical effects add up.

None of the users of the glasses subjectively noticed a change in the optical properties of the glasses.

3.12 Formula 1 races

Cars driving on a race track have interesting behavior. This depends on direction as well as time (due to the rotation of the Earth).

For example, let's look at what Bob observes while watching the famous 24 Hours of Le Mans race.

During the race, the shape of the cars on the east-west sections of the track changes from short with tall elliptical wheels to long and low with flat elliptical wheels.

On the north-south sections, low cars with flat wide wheels will change to narrow cars with narrow round wheels. The shape of the car and the wheels change when cornering because the direction of movement changes.

Let's take a closer look at the behavior of racing car wheels. That is, for spinning elliptical wheels. The car does not rattle as it should if the wheels were not circular. The ellipse does not rotate with the wheel. Only the wheel rotates and it deforms during rotation so that the flattening of the ellipse does not change direction.

It's easy to see if we look at the wheel valve. At maximum speeds, the wheels of the car rotate approximately 50 times per second. So the valve "circulates" the center (bearing) of the wheel 50 times per second. The wheel disc and tire are deformed 100 times in 1 second so that the valve moves closer to the center of the wheel and moves away again at exactly twice the wheel rotation speed. When the car drives slower, the valve approaches less often, when faster, more often. At the same time, the disc of a racing wheel is made of very high-quality and strong materials, which require enormous forces for such large deformations.

When Bob chooses a suitable spot on the Le Mans track, he can observe the effect of flattened (elliptical) wheels with a large flattening that occurs many times per second. And in the same place, the behavior changes during the race.

When Bob chooses one car and follows it around the circuit, he notices that both the car and its wheels are changing. In addition, the transformation also changes during the race.

A short car with tall elliptical wheels turns into a long car with flat elliptical wheels and also a narrow car with narrow round wheels.

And since the Le Mans circuit lies at 48° latitude, these effects do not have the same magnitude (length ratios).

3.13 Free fall effect

Bob observes a repeated free fall on the equator (e.g. in Ecuador) performed using a measuring device allowing the measurement of the free fall time from a height of 5m. From the measured values (fall length and fall time), Bob calculates the gravitational acceleration on Earth. They find that repeated free falls performed in the same location with the same equipment give different results.

At the moment when the measuring device is farthest from the center of the Earth, it observes a free fall from a height of 5m, which lasts according to Bob's clock $\Delta\tau = 0.505s$ and has a gravitational acceleration of $g = 39.2m/s^2$.

At the second moment, 6 hours after the first experiment, when the measuring device is closest to the center of the Earth, it finds that the fall from a height of 2.5m also takes $\Delta\tau = 0.505s$. The resulting acceleration is $g = 19.6m/s^2$.

Thus, the gravitational acceleration changes in a ratio of 1:2 2 times a day and is the largest at the place that is farthest from the center of the Earth, and the smallest gravitational acceleration is at the place when the measuring device is closest to the center of the Earth.

3.14 Pulley effect

The use of the pulley has an interesting effect on the rope that passes over the pulley. On the equator, a situation occurs twice a day when the rope leading over the pulley lengthens or shortens during movement.

When a rope is used that has marks on it that are equidistant from each other, and such a rope is guided over a pulley where it is almost horizontal on one side and vertical on the other (for example, when lowering and pulling a water bucket from a well), then the marks in the vertical part of the rope are closer together than in the horizontal part. When lowering, the marks on the rope that passed over the pulley get closer (the rope gets shorter).

On the contrary, when pulling out, the mark on the rope that passed over the pulley moves away. Both are without damage to the rope which is still taut. So the jack moves slower than the horizontal part of the rope moves.

3.15 Tides

Bob also observes the Moon and its orbit around the Earth. It is also elliptical with a semi-axis ratio of 1:2. The orientation of the flattening is the same as the flattening of the Earth and also the flattening of the Earth's orbit around the Sun.

According to Newton's law of gravity, the tides should respect this geometry of the motion of the Earth and the Moon. The maximum size of the tide occurs at the moment when the Moon is between the Sun and the Earth, that is, at the time of the new moon. Because the orbits of the Earth and the Moon are flattened, the distance of the Earth from the Sun and from the Moon at the time of new moon depends on the season.

The amplitude of tides is inversely proportional to the cube of the distance, according to Newton's law of gravity. Therefore, the height of the highest tide should change in a ratio of 1:8 twice a year. A period of low tide should alternate with a period of up to 8 times larger tide after about 3 months.

Because the position of the Earth in its orbit around the Sun changes at the same time, the influence of the Earth's flattening effect changes. At the time of the greatest approach, i.e. the greatest flattening, the height of the tide is also reduced on the equator to 1:2 due to the flattening. In Canada, the effect is smaller, so the height of the tide should be only 5.6 times greater.

Additionally, there is a length contraction effect that applies to a partial extent. So overall only 4x bigger.

The highest measured tide is in Neah Bay, Nova Scotia, Canada [9], it has a size of about 11.5m.

Due to the flattening of the Earth's orbit and the Moon's orbit, according to Newton's law of gravity, a situation should occur twice a year that Bob will measure the height of the tide at about 11.5m and twice a year he

should measure the tide with a level difference of over 45m.

It is noteworthy that the effect of buildings also occurs at the same time, i.e. the maximum tide according to Newton's law of gravity is greater than a building 60m high. Because even the height of the building observed by Bob will decrease.

This is not the case when Bob measures the sea level difference of Neah Bay so he measures the tide height in the range of 8.1 to 11.5m. At the same time, paradoxically, it will measure the maximum height of the tide at the time when the Moon and the Sun are farthest from the Earth and the minimum at the time when they are closest to the Earth. This is another contradiction to Newton's law of gravity.

3.16 The effect of the definition of the physical unit of distance

In the history of physics, the distance unit meter has been defined in different physical ways:

- 1791 - ten-millionth of the earth's quadrant
- 1799 - 1960 - the distance between the lines of the reference bar
- 1960 -1983 - a multiple of the wavelength of krypton radiation
- 1983 - fraction of the speed of light (distance in 1s).

Let us analyze the properties of these definitions.

3.16.1 Earth Quadrant

The circumference of an ellipse with an eccentricity corresponding to Bob's speed is 0.77 times smaller than the circumference of a circle. Thus, the length of a meter according to the definition from 1791 will be 0.77 less and therefore all distances measured by this shorter meter will be 1.3 times larger.

As the Earth rotates, the length of the meridian changes. The meridian in the direction of Bob will be shortened, the perpendicular meridian will

remain unchanged. The length of the meridian will change twice a day, so the length of the distance unit will also change twice a day. And therefore the distances measured by this variable reference meter will also change twice a day.

3.16.2 The distance of the lines of the standard

The length of the standard will change depending on the direction and the time. Since the standard of the meter shortens as well as the dimensions of the objects measured by it, the numerical values of the distances come out unchanged. And therefore the length contraction by SRT will not be measurable.

3.16.3 Wavelength of light

There are two possible interpretations of the application of SRT transformations to the wavelength of light.

It is a distance and thus distance transformations are applied. This means that the wavelength depends on the direction of the beam. This will change with time due to the rotation of the Earth. So the light will change its color (wavelength) and the effects will be the same as in the case of lines on the standard.

The second interpretation is that the wavelength of light is given by the relation $\lambda = c/f$ where f is the frequency of the light, i.e. $f = 1/T_0$ where T_0 is the period of oscillation.

Time is transformed by SRT and c is constant. Time transformation is independent of direction.

In this case, Bob measures half the period of the oscillation and therefore twice the frequency. Therefore, the wavelength of light is halved regardless of direction.

This means that the effect of length contraction in the direction of movement will numerically be zero, the numerical value of the distance will be the same, thus contradicting SRT. On the contrary, the distances measured in the perpendicular direction will be numerically doubled, i.e. also contrary to SRT.

3.16.4 The speed of light

According to the SRT axiom, the speed of light is constant in all coordinate systems.

Time transforms. Time transformation does not depend on the direction of movement of the coordinate system. The distance transformation is dependent on the direction of movement.

Light travels 300 thousand km in 1s in the direction perpendicular to Bob's motion. Bob will measure a time of 0.5s, i.e. the length of the meter in Bob's coordinate system will be 2m. This means that the distances measured with such a meter will be halved, i.e. contrary to SRT.

Light travels 300 thousand km in 1s also in the direction of Bob's movement. Bob measures a time of 0.5s, and at the same time measures a distance of 150 thousand km. So the length of the meter in Bob's coordinate system will be 1m. So the distances measured with this meter will be in agreement with the SRT.

The length of a unit of distance depends on the direction and therefore also on time due to the rotation of the Earth.

3.16.5 Summary

Thus, all definitions of meter used in history, except for one variant of the interpretation, have the physical effect of the time dependence of the reference. That is, the time dependence of all measured distances using a physical unit defined in this way.

The only exception is the interpretation based on the frequency of the reference light source. In this case, the length of the reference is independent of the direction and therefore of the rotation of the Earth. In this case, the length of the reference meter depends on the speed of movement of the coordinate system. In this case, the numerical values of the measured distances will contradict the SRT regardless of the direction.

4 Alien Alice

The alien Alice, unlike Bob, moves at a speed of $v = 0.44\ c$, i.e. roughly half the speed of Bob. It also moves in the plane of the Earth's ecliptic. For Alice, β or $\gamma = 0.9$.

In Alice's coordinate system, all the described effects are visible as in Bob's coordinate system, except that the numerical values are significantly different.

For example, the maximum speed of upward movement due to the Earth's rotation is 165km/h at the equator. That's 5x slower than Bob observes.

The eccentricity of the Earth's orbit is 0.14 and thus 6 times smaller. The ratio of resistances of distribution network conductors is only 4:5, i.e. roughly 13 times smaller. A concrete bridge in China lowers "only" by about 30m, the passenger ship Oasis of the Seas changes its draft by less than a meter. In both cases, 5 times less.

Gravitational acceleration calculated from free fall experiments from data measured by Alice is 3.2x smaller than from data measured by Bob.

When Alice communicates with Bob and they share the results of their observations, they discover that they are observing the same effects but the measured values are many times different, i.e. as if different physical laws work for different observers on Earth.

Therefore, together they compile a table of contradictions of observed effects with experimentally verified physical laws. They find that the following laws of physics are violated:

1. 1st and 2nd Kerpler's law
2. Newton's law of gravity
3. Laws of strength and elasticity, including Hooke's law
4. Ohm's law
5. Laws of classical (geometric) optics

This means that the 1st SRT principle is not fulfilled

5 Conclusion

SRT coordinate transformations violate the first principle of SRT. SRT contradicts at least five experimentally verified laws of physics and practical experience of earthlings.

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References

[1] A. Einstein, *Zur Elektrodynamik bewegter Körper*, Annalen der Physik, 17, 1905

[2] Laser Interferometer Gravitational-Wave Observatory (LIGO), https://cs.wikipedia.org/wiki/LIGO.

[3] Twin paradox, https://en.wikipedia.org/wiki/Twin_paradox

[4] Bell spaceship paradox, https://en.wikipedia.org/wiki/Bell%27s_spaceship_paradox

[5] R. M. Santilli, *Overview of historical and recent verifications of the Einstein-Podolsky-Rosen argument and their applications to physics, chemistry and biology,* APAV - Accademia Piceno Aprutina dei Velati, Pescara, Italy (2021), http://www.santilli-foundation.org/epr-overview-2021.pdf

[6] A. Einstein, *On the Electrodynamics of Moving Bodies, The Principle of Relativity,* A collection of original memoirs on the special and general theory of relativity, Dover Publications, Inc., 2017, ISBN: 978-0-486-60081-9, pp. 37-65

[7] Qinglong Railway Bridge, China, https://en.wikipedia.org/wiki/Qinglong_Railway_Bridge

[8] Oasis of the Seas, https://en.wikipedia.org/wiki/Oasis_of_the_Seas

[9] NOAA, Where is the highest tide?, https://oceanservice.noaa.gov/facts/highesttide.html